Microsoft


*Operating System*

# Distributed File System (Dfs)

## Beta 3 Technical Walkthrough

**Abstract**

With more and more files being distributed across local area networks (LANs), administrators face growing problems as they try to keep users connected to the data they need. The distributed file system (Dfs) provides a mechanism for administrators to create logical views of directories and files, regardless of where those files physically reside in the network. Fault tolerance of network storage resources are also possible using the version of Dfs included with Beta 3 of the Microsoft® Windows® 2000 operating system.

This technical walkthrough describes how to use the Dfs Share Creation Wizard. For more information on the capabilities of Dfs, see the Dfs white paper located at http://www.microsoft.com/ntserver/info/easymanage.htm.

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## INTRODUCTION

With more and more files being distributed across LANs, administrators face growing problems as they try to keep users connected to the data they need. The distributed file system (Dfs) provides a mechanism for administrators to create logical views of directories and files, regardless of where those files physically reside in the network. Fault tolerance of network storage resources are also possible using the version of Dfs provided with Beta 3 of the Microsoft® Windows® 2000 Server operating system.

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## USING THE BETA 2 DFS ADMINISTRATOR TOOL

This technical walkthrough describes how to use the Dfs Administrator snap-in introduced with Beta 2. Installation and service startup for the Dfs service takes place automatically within Windows 2000 Server Setup. However, you must configure Dfs for a Dfs share to be accessible for your clients. The examples provided in this document assume you have already configured the Microsoft Active Directory™ directory service, and have Administrator equivalents for both the domain and the server where you will be configuring Dfs.

### Starting Dfs Manager

When Windows NT Server is installed, you can start the Dfs snap-in one of the following ways:

- From the **Start** menu, point to **Programs**, click **Administrative Tools**, and then select **Distributed File System**.
- From any Microsoft Management Console, select **Console**, then select **Add/Remove snap-in**, click **Add**, and select the **Distributed File System**.
- From a command prompt, type

  ```
  Start %systemroot%\System32\dfsgui.msc
  ```

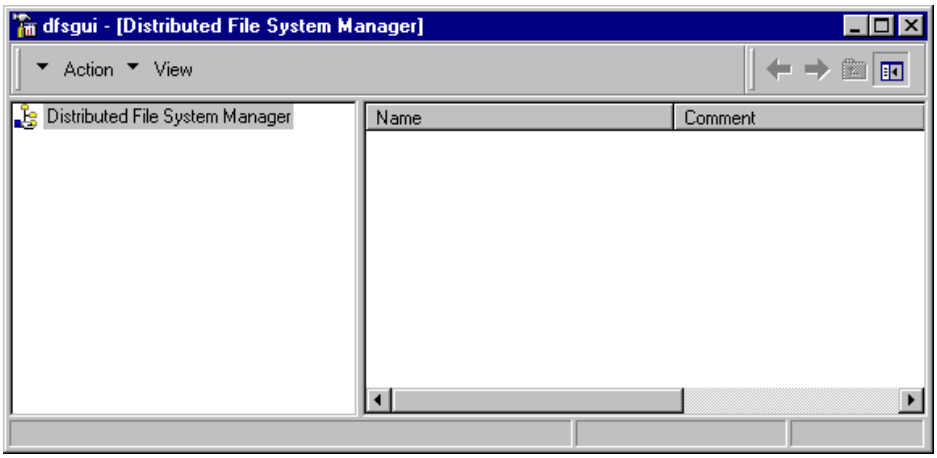


*Figure 1. The Distributed File System Manager (Dfsgui.msc)*

### Setting up a Dfs Root

If this is the first time you've set up a Dfs volume, you need to create a Dfs root.

**To create a Dfs root**

1. Select **Distributed File System** in the scope panel (left panel), and either select **Create a New Dfs Root**, or from the **Action** drop-down menu select **New Dfs Root Volume**.

   **Note** Most menu items can also be reached by right-clicking with your mouse.

   The Create New Dfs Root Wizard starts.

The Windows 2000 release of Dfs can integrate with Active Directory to create fault tolerant Dfs roots on Windows2000 domain controllers and member servers. If you have multiple servers in your Windows2000 domain, any or all participating servers can host and provide fault tolerance for a given Dfsroot (Active Directory is used to ensure the individual servers converge on a common topology for the specified Dfs root.). Alternatively, you can create a stand-alone Dfs server, which does not take advantage of Active Directory and does not provide root level fault tolerance.

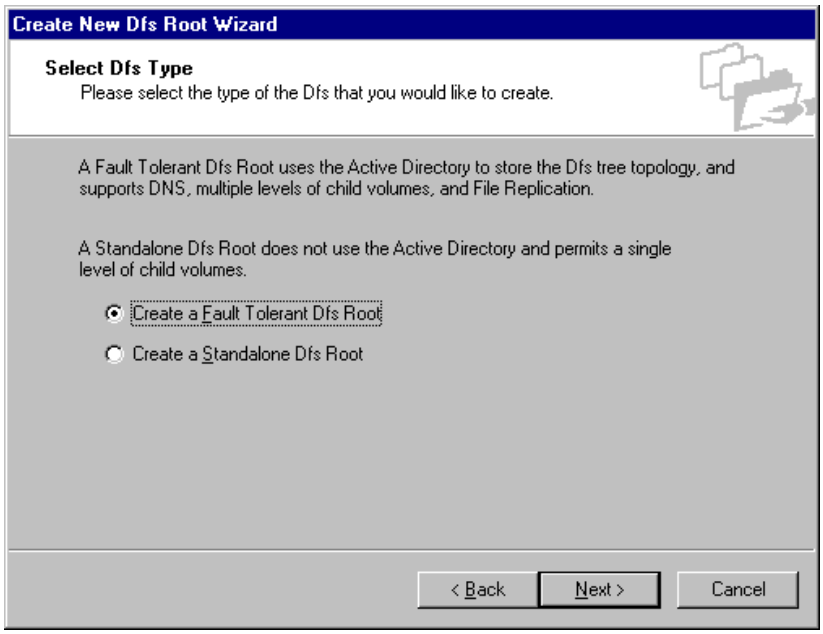


*Figure 2. Create a fault tolerant Dfs root*

For our example, it is assumed you are creating a fault tolerant Dfs Root.

2. Proceed through the wizard by selecting the domain and server that are to host the Dfs Root.

   **Note** The **Select Domain** dialog box is not displayed on a stand-alone Dfs, as stand-alone roots are machine-specific.

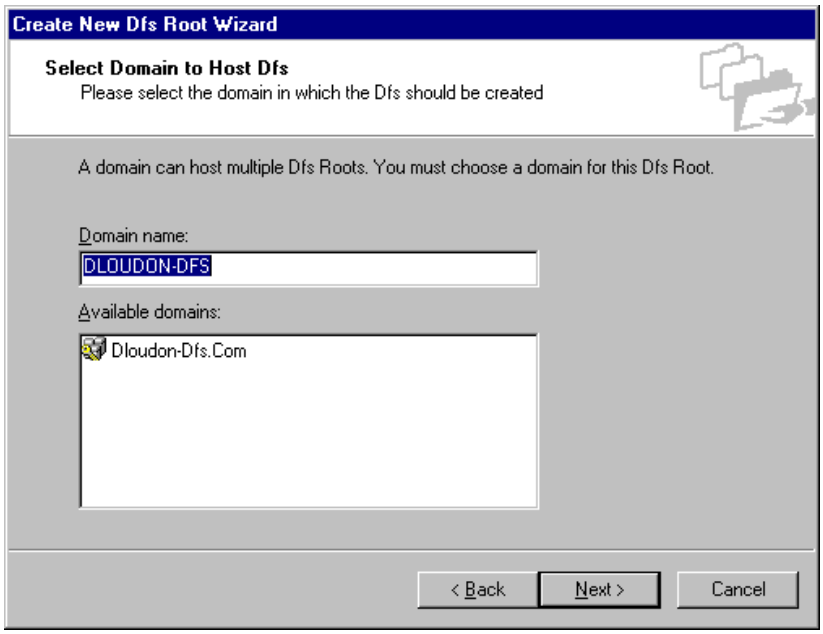


*Figure 3. Select domain to host Dfs*

3. Once you select a domain, select a server to host the Dfs root.

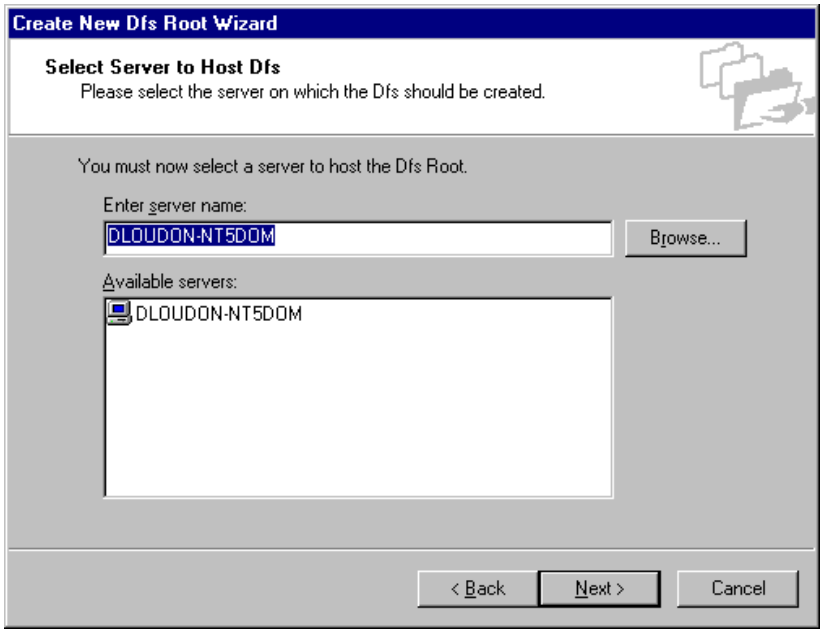


*Figure 4. Select server to host Dfs*

4. Next, you choose the local share point to be used on the target to host the Dfs root. If the local share does not already exist, select **Create New Share**. The DfsAdmin snap-in lets you create both a new share and new directory if necessary.

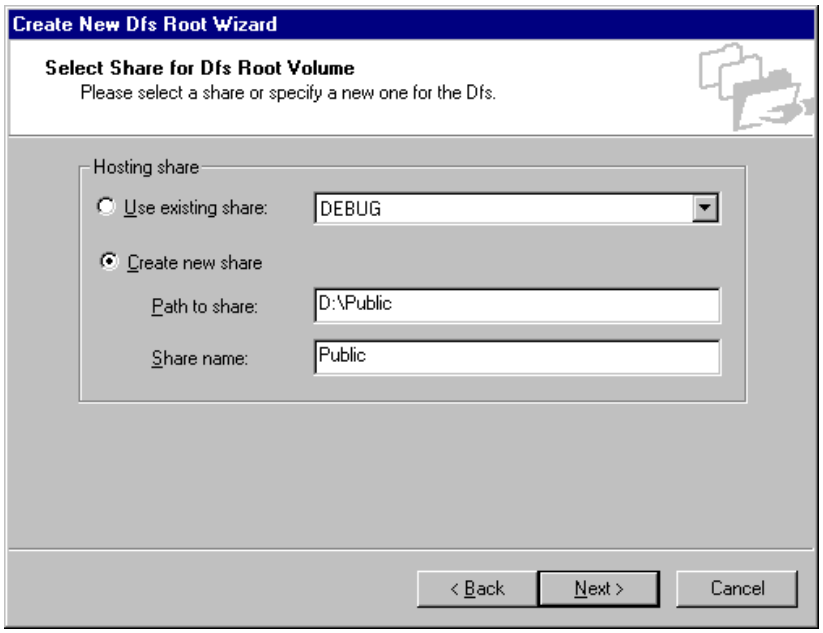


*Figure5. Select the share for the Dfs root volume*

5. Next, you are prompted to select a name to advertise the Dfs within your domain. For simplicity, you can keep this name the same as the share on the local hosting server, but there is no requirement to do so. For larger enterprises, it is likely that the share name and Dfs name will be different, as the domain name must be unique to the domain, whereas the share name is machine-specific.

   You may also optionally have this Dfs added to your current DfsAdmin console. Alternatively, you can add this share to any DfsAdmin console by selecting **Connect to Existing Dfs Root.** Once added, you may wish to save the console for future use.

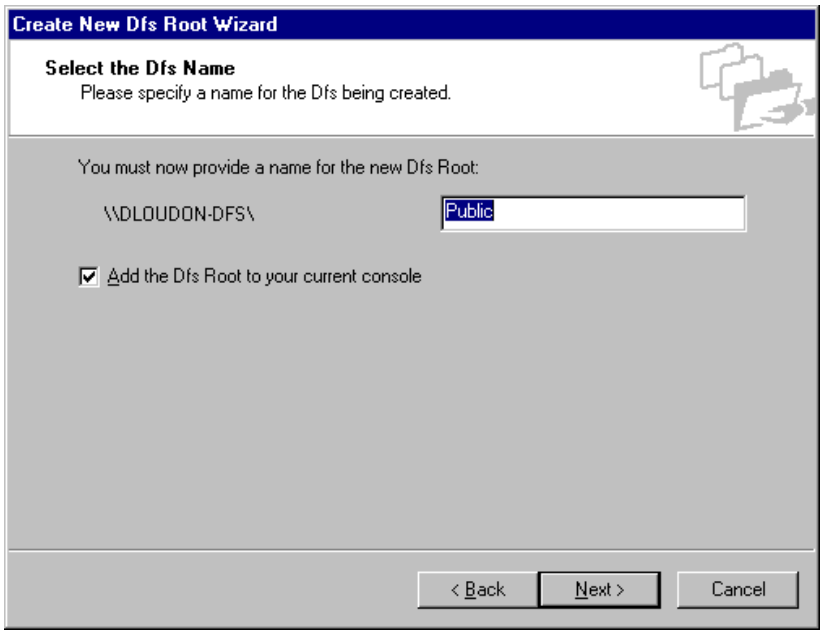


*Figure 6. Select the Dfs name*

6. Once the **Create New Dfs Root Wizard** has completed, you are ready to administer your Dfs root.

**Notes**

If it hasn't been already, you can add this newly created Dfs Root to your console by right-clicking **Connect to Existing Dfs Root**. (See the procedure below.)

If you have multiple domain controllers hosting a fault tolerant Dfs Root, keep in mind that fault tolerant Dfs uses Active Directory to store topology knowledge. Thus, it is necessary for the topology knowledge to converge between the domain controllers. This takes about five minutes between any given two replicating domain controllers. Until convergence occurs, Dfs administrator tools located on different computers can be presented with a different Dfs topology. You can select **Refresh** to update Dfs Manager with the current configuration from the local domain controller.

## Adding the Dfs Root to Your Console and Configuring Replica Sets

If you haven't already, add your Dfs root to your console. Afterwards, you will need to configure replica sets.

**To add the Dfs root and configure replica sets**

1. From the DfsAdmin, select **Connect to Existing Dfs Root**. This presents you with a list of domains that you can browse for existing fault tolerant Dfs Roots.
2. Find your root and select it. There is also an entry for legacy standalone roots. (Optionally, you can manually type in your Dfs root name. This may be necessary if Dfs convergence is still occurring and not all domain controllers are aware of the new Dfs root.)

3. At this point, you have an empty Dfs root in Active Directory. For this share to be interesting to users, you need to publish non-local shares in the Dfs namespace. To do so, right-click your Dfs Root name and then click **New Dfs Child Node**. For this example:

   - Determine the name for the child node you wish to create (for example, *Browser*), and enter that as the **Child Node**. You can browse the current Dfs structure for a starting name, but you still need to enter a final directory name that *does not* already exist.
   - Locate a valid Windows 2000 share anywhere on your network (for example, \Products1\RelSys), and type the full universal naming convention (UNC) name in the **Send the user to this network path** box. Alternatively, you can browse for it.

     **Note** You can also specify directories beyond the share level (for example. \Products1\RelSys\Win98).

   - You can optionally specify a comment and a timeout value. The time-out value is the number of non-use seconds that individual clients have to cache the referral, after which they must retrieve a fresh referral from one of the hosting Dfs servers.

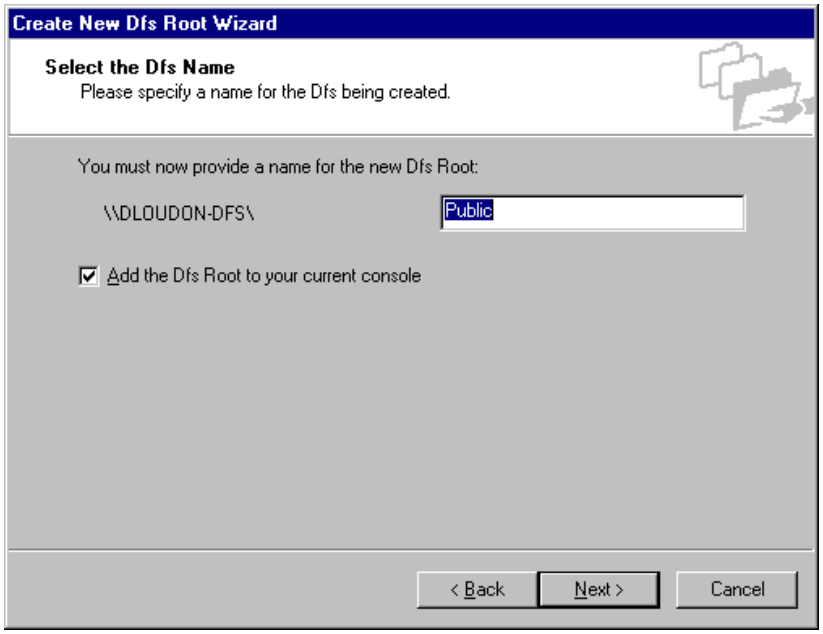


*Figure 7. Add Dfs root to console*

4. If there are multiple servers to configure for this child node (for example, two servers host identical information, one in Hartford, the other in Seattle), you can add to this replica set. To do this, highlight the junction, right-click, select **New Dfs Replica Member**, and fill in the appropriate UNC.

As you add more child nodes, they are listed in alphabetical order based on their offset from the Dfs root.

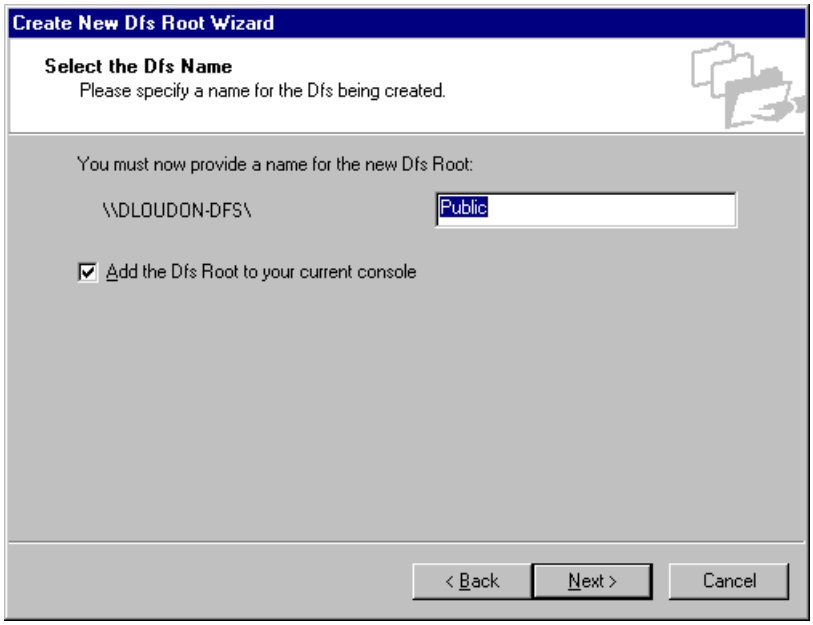


*Figure 8. List of child nodes*

## Configuring Replication

If you have multiple servers hosting any one replica set, you can configure replication to occur between these servers. You should first familiarize yourself with the topology between the participating servers and understand how network performance can be impacted based on available bandwidth, replication schedules, and the quantity of replication traffic likely to occur.

**Note** Only Windows 2000 servers running the Dfs Service with their hosting shares formatted as NTFS version 5.0 can participate in replication.

### To configure replication

1. Select the replica set.
2. Right-click, and choose **Replication Topology**. You are presented with a list of participating servers.
3. Select the servers that will replicate. The topology is configured automatically.

   **Note** If you want to configure scheduling or override a topology, you need to do so in the Sites and Services Manager snap-in. DfsAdmin configures a Star topology (all points connect to all other points). A future release may offer more flexibility of topology choices.

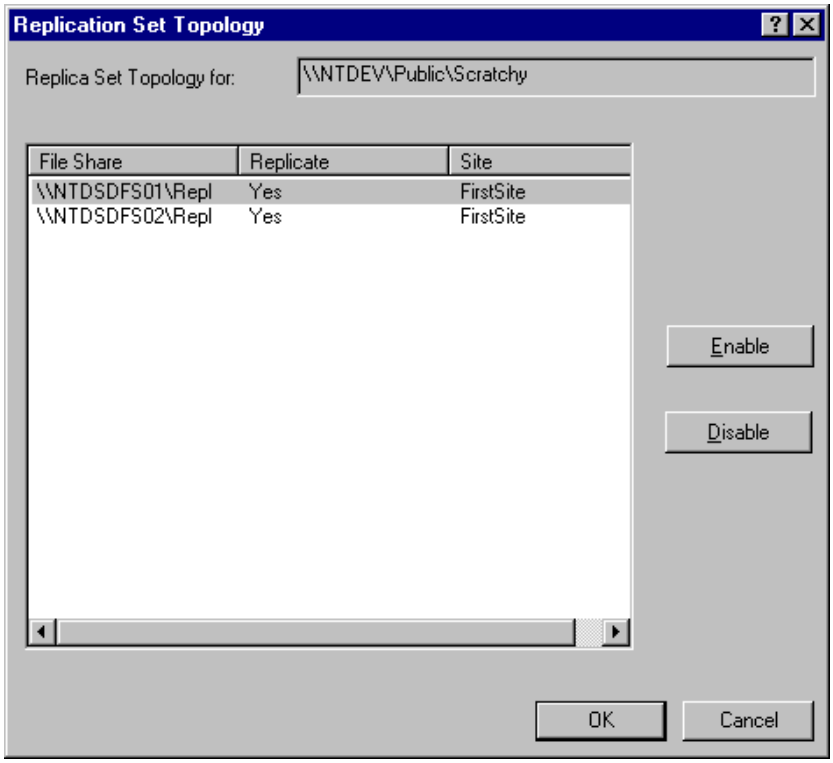


*Figure9. Replication set topology*

## Test Drive the Dfs

Any user of Windows 2000 logged on to your domain can now access the fault tolerant Dfs. Assuming they have proper access privileges, they can negotiate the individual junctions by using the following command:

```
NET USE * \\your domain name\your Dfs share name
```

In the example used in the document, the command would be:

```
NET USE * \\Dloudon-Dfs\Public
```

When a drive letter is returned, type **dir** to see the contents of the client computer's share. In a production environment, this alternate drive could reside on another server or on a user's workstation. Any user accessing the fault tolerant share would therefore be able to continue to working uninterrupted. Scheduled file server maintenance, software upgrades, and other tasks that normally require taking a server off-line can now be accomplished without user disruption.

**Note** Dfs-aware clients using older versions (such as Windows NT 4.0) are not able to connect with fault tolerant Dfs Roots. They can, however, connect directly to individual Dfs roots that participate in a fault tolerant Dfs. To do this, substitute the *machine name* for the *domain name* in the above **Net Use** command.

Windows NT-based workstations browsing Dfs can also verify what physical storage they are referencing by viewing the **Dfs** Tab available in System Properties inside Windows NT Explorer (see Figure 10).

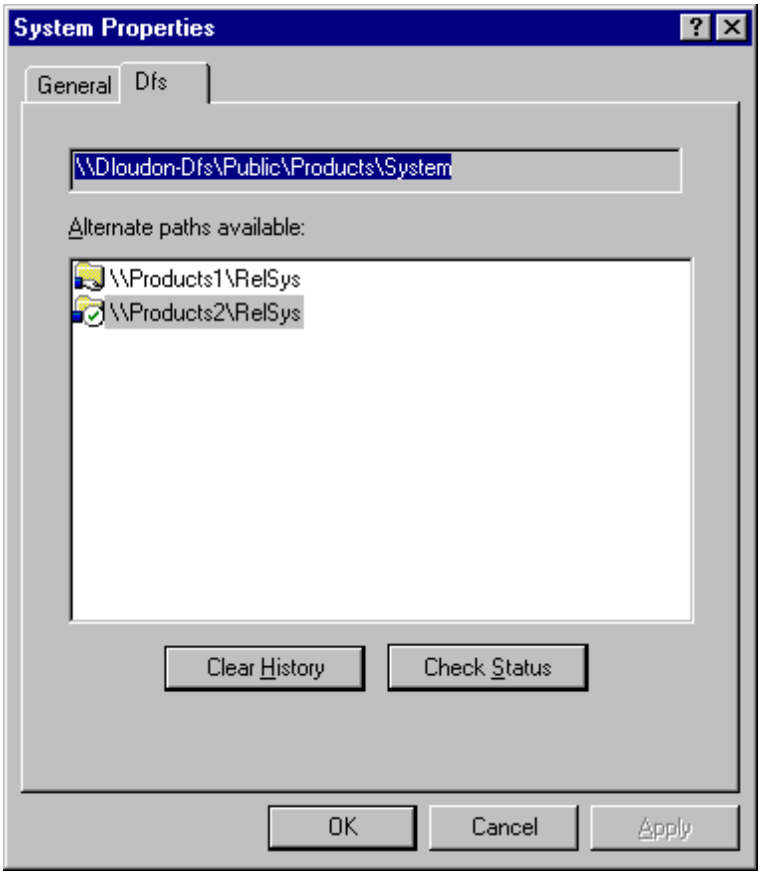


*Figure 10. System Properties in Windows NT Explorer*

You can also publish your fault tolerant Dfs root as a shared folder in the directory service, and then accessit using any directory service browsing tools. From the Directory Management snap-in, select your domain, right-click **New, Volume**. Fill in the appropriate information (see Figure 11).

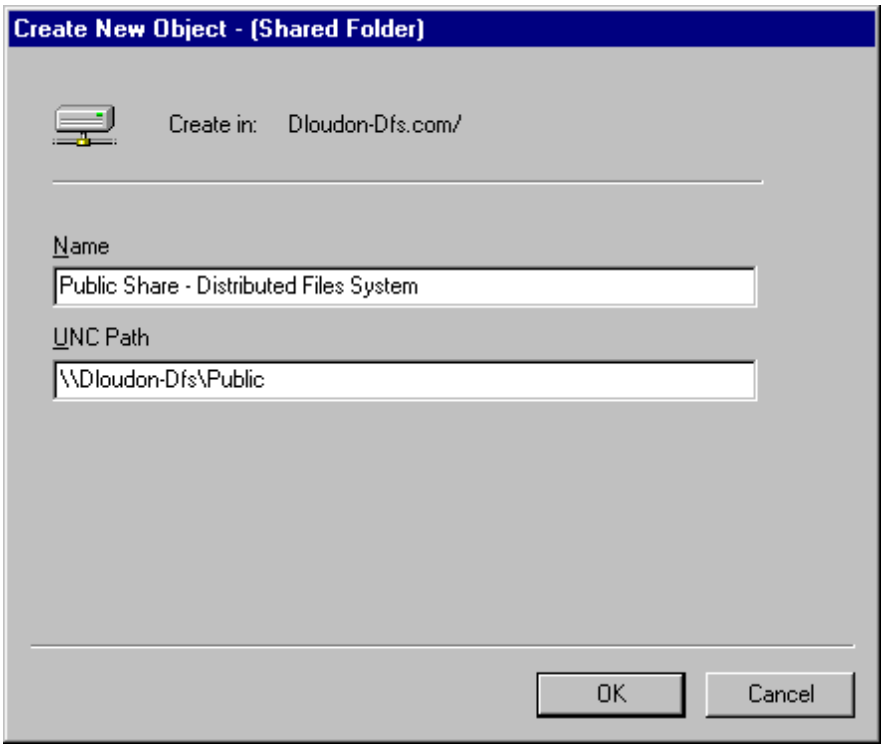


*Figure 11. Creating a new shared folder*

You can later modify the properties of this object.

## Microsoft Cluster Server

At present, Dfs supports Microsoft Cluster Server using machine-based Dfs only. You cannot create fault tolerant Dfs topologies on systems running Microsoft Cluster Server.

## Removing Dfs

If a machine-based Dfs configuration is damaged and you are unable to stop hosting a Dfs volume through DfsAdmin, you can reset the Dfs knowledge on the computer.

**To reset the Dfs knowledge on a computer**

1. Run the Registry Editor (RegEdt32).
2. Locate the following registry key:

```
HKEY_LOCAL_MACHINE\
  Software\
    Microsoft\
```

3. Delete the **DfsHost** folder and any subfolders it contains.
4. Locate the following registry key:

```
HKEY_LOCAL_MACHINE\
  SYSTEM\
    CurrentControlSet\
      Services\
        DfsDriver\
          LocalVolumes\
```

5. Delete any folders under this folder. Do not delete the LocalVolumes folder.
6. Reboot the computer.

If a fault tolerant Dfs configuration is damaged and you are unable to stop hosting a Dfs volume through DfsAdmin, you can reset the fault tolerant Dfs knowledge on the computer and from Active Directory using the following procedure.

**Note** This procedure will be simplified before the final version of Windows 2000 is released.

**To reset the Dfs knowledge on a computer and from the Active Directory**

1. Perform steps 1–5, above (do not reboot the computer).
2. Run the Directory Management Microsoft Management Console (MMC) tool. From the **Start** menu, point to **Programs**, then **Administrative Tools**, and then click **Directory Management**.
3. Highlight the domain name.
4. From the **View** menu bar, select **Advanced Features**.
5. Highlight the Dfs-Configuration object.
6. In the scope panel (right panel), highlight the fault tolerant Dfs name you want to remove. Click **Action** and then select **Delete** to remove the fault tolerant Dfs from the Dfs.

7. Reboot the computer(s) in the fault tolerant Dfs.

## Convergence

If you are using fault tolerant Dfs where multiple domain controllers exist, it is important to consider that the Dfs topology requires time to converge between participating root servers(as individual servers homein on different copies of the directory service). It is suggested that you first set up your fault tolerant Dfs share by creating one root, then build up the Dfs topology on that root. Once complete, and once confident that Active Directory has replicated to other domain controllers (this typically takes about five minutes), you can add other servers at the root level.

## FOR MORE INFORMATION

For the latest information on Microsoft Windows 2000 network operating system, visit our World Wide Web site at http://www.microsoft.com/windows/server/ and the Windows NT Server Forum on the Microsoft Network (GO WORD: MSNTS).

A white paper that describes Dfs is available at http://www.microsoft.com/windows/server/Technical/fileprint/.

For the latest information on the Windows 2000 Beta 3, visit the Web site at http://ntbeta.microsoft.com.

### Before You Call for Support

Please keep in mind that Microsoft does not support these walkthroughs. The purpose of the walkthroughs is to facilitate your initial evaluation of the Microsoft Windows 2000 features. For this reason, Microsoft cannot respond to questions you might have regarding specific steps and instructions.

### Reporting Problems

Problems with Microsoft Windows 2000 Beta 3 should be reported through the appropriate bug reporting channel and alias. Please make sure to adequately describe the problem so that the testers and developers can reproduce it and fix it. Refer to the Release Notes included on the Windows 2000 Beta 3 distribution media for some of the known issues.